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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
Division of Forest Insect Investigations

PLAN FOR ESSENTIAL RESEARCH REQUIRED IN SCHEDULING LODGEPOLE PINE NEEDLEMINER CONTROL PROJECT YOSEMITE NATIONAL PARK 1953

Work plans for the aerial spray control of lodgepole pine needleminer infestations and appraising the results have been formulated for the proposed 1953 lodgepole pine needleminer project in Yosemite National Park. These plans have been well thought out and should serve quite adequately in organizing and conducting this project.

A most important adjunct to this project is full knowledge of biological events and the effect of natural control factors which will serve to provide accurate information for use in scheduling the spray applications, and possibly even in limiting the extent of area to be sprayed. For this purpose, a close check will be kept through rearings, field sampling, observations and microscopic examinations. The details of this record and study in conjunction with the needleminer project are presented below. This research phase will be under the supervision of C. R. Struble, Entomologist, Forest Insect Laboratory.

Emergence Period

A. Data from population survey samples

This will be determined for the full period (first, peak, last) by rearing out adults from infested material placed in rearing cages. This material, for the most part, will consist of tip samples checked for preliminary population surveys, as described in the plan for appraising results by R. C. Hall. This material as planned therein will be divided into units of 20 tips per rearing cage, but all tips within a single rearing unit should be representative of 5 trees from a specific locality and so labelled. In this way, any differences in emergence from specific localities due to parasitism or disease could be traced. Each rearing unit will be labelled "Population Survey Samples" followed by serial number, then information on locality. Separations will be made between material from areas designated for spraying and areas designated as check.

Separate records for each rearing unit will be maintained. Information to be recorded will be as follows:

1. Nature or designation of material
2. Serial number of cage
3. Date material placed in rearing
4. Daily record of moth emergence from start to completion, showing also the number and character of parasitic and associated insect species

B. Data from areas believed varying as to infestation intensity as follows: (1) north end of Tenaya Lake - 20 tips from 5 trees; (2) one mile northward (same type sample); (3) one mile northward from (2) (same type sample); (4) one mile northward from (3) same; (5) one mile northward from (4) same. If infestations continue beyond 5, set up additional samples each mile apart. The purpose of this is to have a double check on populations occurring in similar size samples with variations which may be due to infestation intensity or to virus or parasitic enemies. Cages containing this material will be numbered serially, prefixed by "Infestation Intensity Studies," showing also the exact location from which the material was taken. Daily records of moth emergence and emergence of parasites and associates will be kept as indicated above.

All collections under (A) and (B) will be made at the same time each day, preferably toward evening, say at 4:30 p.m. and again at 7:30 p.m. A preliminary check on the time of greatest emergence should be made by recording emergence from a few cages at 10:00 a.m. and 2:00 p.m., as well as the later periods of 4:30 p.m. and 7:30 p.m.

All material for recording of emergence and parasite data should be collected, placed into rearing, numbered, and labelled not later than July 10, preferably a week earlier.

As soon as all moth and parasite emergence is definitely over, empty cages and record for each cage the number of moths and parasites which died within the cage.

Egg Laying Period

Records for egg presence, number, variation, and principal location will be started as soon as it is determined that the moth flight is approaching a peak. This will be done by collecting samples of tips in different portions of the infested area (preferably at the same location as emergence samples, at one mile intervals from the north end of Tenaya Lake) from mid-crowns of the trees (20 tips from 5 trees). Microscopic examinations for eggs will be required. Records will include: (1) location; (2) tree number (1-5); (3) tip number (1-4); (4) number of eggs; (5) notes on location of eggs on twig or needles and incubation status. Weekly collections, examinations, and records will be kept until emergence data show that the moth flight is over.

Egg Hatch

Following that time, frequent checks should be made to determine incubation status. This can be done by microscopic examination of eggs to note the development of larvae inside the chorion. It would be helpful to have 100 eggs each from 3 or 4 elevations within the infestation zone under observation in petri dishes for this purpose. This should be supplemented by examination of undisturbed eggs taken from the field, and samples sufficient to provide a reasonably accurate idea when most of the eggs will hatch.

Collections

1. Mature moths. A collection of about 100 good specimens should be killed and preserved dry between layers of tissue paper in containers. Only choice undamaged specimens are wanted.

2. Parasites - Preserve all parasites in alcohol for later checking for identity and number. Keep collections separate and label according to cage number and other appropriate labelling.

Scheduling of Spray Project

This will be determined as a result of the information obtained on egg incubation. This project will be scheduled as soon as it is established within reasonable limits that 75 per cent or more of the eggs show fully formed larvae within the transparent chorions. This is perhaps the most important phase of the project, and hence will require the closest care in examinations and recordings that are made.

Equipment Needs

Cages - 50 one-gallon ice cream cartons
Vials - 2 gross shell vials (size)
Masking Tape
Scotch Tape
200 5x8 Record Cards
Notebooks
Pencils
One quart Alcohol.
Five dozen 1-dram vials and corks to fit.
One roll cotton
One dozen pill boxes
One package Kleenex or cellucotton

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